a temperature detecting unit that detects a temperature of the static magnetic field generating unit and/or surroundings thereof; and

a control unit that controls the magnetic field correcting unit based on the temperature detected by the temperature-detecting unit.

REMARKS

Claims 1-13 are rejected. Claims 1 is herein amended to correct typographical error. Reconsideration of the present application in view of the following comments is respectfully requested. Claims 1-13 are in the case.

Claim rejections under 35 U.S.C. § 102(b) or § 103(a)

Claims 1-13 are rejected under 35 U.S.C. § 102(b) as allegedly anticipated by *Ishihara et al.* (U.S. Patent 5,378,987; "*Ishihara*") or, in alternative, under U.S.C. § 103(a) as being allegedly unpatentable over *Ishihara*. Specifically, the rejection states that *Ishihara* teaches a nuclear "magnetic resonance" imaging apparatus comprising: a "static magnetic field generating unit" (main magnet 10 of Fig. 1); a "gradient magnetic field generating unit" (gradient coil system 12 and gradient coil power source 13 of Fig. 1); a "high-frequency magnetic field generating unit" (component 16, the RF probe which applies RF pulses, and component 17, the RF transmitter which supplies the RF pulses to the probe, of Fig. 1); a "detecting unit" (*i.e.*, receiver 18 of Fig. 1), and so on.

Applicant respectfully traverses the rejection.

Ishihara discloses "[a] non-invasive ***measurement of a temperature distribution within a target body*** using a nuclear magnetic resonance imaging, capable of realizing a high speed and a high precision measurement, and accounting for a displacement of the target body during the measurement. The chemical shift data from the target body at each voxel in an imaging target region on the target body are collected with and without a temperature change of the target body, a difference between the chemical shift data collected with the temperature change and the chemical shift data collected without the temperature change at each voxel, and a temperature distribution image is constructed and displayed according to the difference calculated" (*see* ABSTRACT) (emphasis added).

Firstly, applicant points out that Ishihara's disclosure is directed to a method of measuring ***temperature distribution within a target body***, and ***NOT*** directed to a method for maintaining high uniformity of the magnetic field in a measurement space ***by detecting a temperature of the static magnetic field generating unit*** as disclosed by the present invention.

With respect to Claim 1, the examiner noted "[the reference teaches] a temperature detecting unit that detects a temperature of the static magnetic field generating unit and/or, surroundings thereof" and the reference "teaches 'a control unit' (*i.e.* sequence controller 19) that controls the magnetic field correcting unit . . . based on the temperature detected by the temperature-detecting unit" (page 4, first paragraph of the Office Action). This interpretation of the reference is in error for the following reasons:

Concerning the heating device 21 and the heating control device 22, the reference only teaches that the heating device 21 is ***for heating the target body in the hyperthermia treatment*** and the heating control device 22 is ***for driving the heating device 21 appropriately*** (*see* col. 5, lines 7-10 and lines 52-57; and col. 7, lines 4-6). The heating device 21 is used ***only when the hyperthermia treatment is conducted*** and the heating control device 22 controls ***only the heating device 21***. Figure 1, upon which the examiner relies for the basis of the rejection, indicates this relation clearly. Namely, Fig. 1 shows a one-way arrow going from CPU 20 to the heating control device 22, and from the latter to the heating device 21. It should be noted that ***no control signal is input into CPU 20 or shim coil system from the heating control device***. As the Examiner acknowledges, the goal of *Ishihara*'s invention is to measure and visualize the temperature distribution within a body using NMR and it has ***nothing to do with measuring the temperature of the magnet (i.e., the static magnetic field generating unit) and controlling the static magnetic field generating unit based on the temperature of the magnet as disclosed in the present invention***. In other words, the reference neither teaches nor even suggest means for detecting ***a temperature of the static magnetic field generating unit and/or surrounding thereof*** or ***the influence of the temperature on uniformity of the static magnetic field***.

Accordingly, the rejections of claim 1 and the dependent claims 2-7 under U.S.C. § 102(b) as being anticipated by *Ishihara*, or, in alternative, under U.S.C. § 103(a) as being unpatentable over *Ishihara,* should be withdrawn.

The rejection further states under item 13 on page 6 that "the relationship of temperature, temperature change and temperature distribution to the static magnetic field homogeneity is also taught by *Ishihara et al.*" and that "the temperature change ΔT influences the inhomogeneity of the static magnetic field." This interpretation is also in error. The description from col. 6, line 24 through col. 7, line 34, upon which the Examiner bases his rejections, does ***NOT*** teach the influence of the temperature change on the inhomogeneity of the static magnetic field; but rather it teaches ***the influence of the inhomogeneity of the static magnetic field (δBH) on the chemical shift (phase difference)***. In *Ishihara*'s method, the temperature distribution within a body is imaged ***by measuring the chemical shift of***

NMR signals (phase difference) and, for accurate and precise chemical shift measurements, it is necessary to eliminate the influence of the inhomogeneity of the static magnetic field. In particular, the phase difference can be caused by a chemical shift due to the temperature change (δBT), inhomogeneity of the static magnetic field (δBH) and an inherent chemical shift (δBC). The expression (9) in col.6 shows that the influence of δBH and δBC are removed ***to obtain the temperature change, ΔT (or temperature dependency δBT)***. Thus, the expression (9) clearly indicates that *Ishihara* does not teach or even suggest the influence of the temperature on the inhomogeneity of the static magnetic field.

With respect to Claim 8 and the dependent claims thereof, the same argument applies as above. Specifically, since *Ishihara* does not teach or even suggest the detection of a temperature of the static magnetic field generating unit or the relationship of the temperature to the static magnetic field homogeneity, these claims are not obvious over *Ishihara* at all. In addition, the Examiner erroneously notes that the reference teaches or suggests the step of calculating a strength of the additional magnetic field. The cited portion of the patent (col. 10, lines 22-25) merely teaches the way how the phase change due to the body movement can be nullified (*see also* col. 10, lines 14-20). This teaching has no relation to calculation of a strength of the additional magnetic field.

The same argument can be also applied to the rejection of claim 13. *Ishihara* does not teach or even suggest uniformity correcting means that detects a temperature change of the static magnetic field generating unit and/or surrounding thereof which affect the uniformity of the magnetic field and generates a magnetic field for canceling a change of the magnetic field intensity due to a temperature change.

Accordingly, none of the claims are anticipated by or obvious over *Ishihara* and all the rejections under U.S.C. § 102(b) or under U.S.C. § 103(a) should be withdrawn.

No fee other than the extension fee is believed to be due for this submission. Should any fee be required, please charge the same to Pennie & Edmonds LLP Deposit Account No. 16-1150.

Respectfully submitted,

Reg. No 43,827

Date February 11, 2002

for 24,576

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Enclosure

EXHIBIT A

MARKED-UP VERSION OF THE AMENDED CLAIM

Application Serial No. 09/535,241

Please amend claim 1 to read as follows:

1. (Amended) A magnetic resonance imaging apparatus comprising:

a static magnetic field generating unit that generates a static magnetic field of a constant magnetic field intensity;

[an] **a** gradient magnetic field generating unit that generates a magnetic field strength gradient;

a high-frequency magnetic field generating unit;

a detecting unit that detects nuclear magnetic resonance signals generated from an object to be examined; and

a display unit that displays a result of the detection, wherein the magnetic resonance imaging apparatus further comprises: a magnetic field correcting unit that generates an additional magnetic field for making uniform a space distribution of the static magnetic field;

a temperature detecting unit that detects a temperature of the static magnetic field generating unit and/or surroundings thereof; and

a control unit that controls the magnetic field correcting unit based on the temperature detected by the temperature-detecting unit.